

AMENDMENTS TO THE CLAIMS

Claim 1 (currently amended): A sensor protein comprising ~~an insert-type~~ a fusion protein ~~composed of which comprises~~

a reporter protein which can generate a measurable signal, and

a binding protein which is 100 to 1000 amino acid residues in length, which specifically recognizes and binds a target substance, and which changes the structural stability of the fusion protein upon binding to the target substance, wherein ~~said the~~ the binding protein is inserted into the amino acid sequence of ~~said the~~ the reporter protein at an exposed site on the structural surface of the reporter protein, and wherein the insertion of the binding protein does not disrupt the ability of the reporter protein to generate the measurable signal.

Claim 2 (cancelled)

Claim 3 (currently amended): The sensor protein according to Claim 1 ~~or 2~~, wherein the binding protein is ~~a protein selected from~~ from the group consisting of metal ion-binding proteins, DNA-binding proteins, cAMP-dependent protein kinase, cGMP-dependent protein kinase, hydrolase, ATP-binding proteins, GTP-binding proteins, nitric monoxide synthase, glucose-binding proteins, maltose-binding proteins, hormone receptors, single chain antibodies and chaperons; or a ~~functional~~ fragment thereof ~~or a mutant thereof~~ which changes the structural stability of the fusion protein upon binding to the target substance.

Claim 4 (currently amended): The sensor protein according to ~~any one of Claims 1-3~~ Claim 1 or 3, wherein the reporter protein is an enzyme protein, a fluorescent protein or a fluorescence-labeled protein, or a mutant thereof.

Claim 5 (currently amended): The sensor protein according to Claim 4, wherein the enzyme protein is ~~an enzyme protein~~ selected from the group consisting of protease, nuclease,

alkaline phosphatase, β -galactosidase, luciferase, glucose oxidase, chloramphenicol acetyl transferase and peroxidase, ~~or a mutant thereof.~~

Claim 6 (original): The sensor protein according to Claim 4, wherein the fluorescent protein is Green Fluorescent Protein, Red Fluorescent Protein or a mutant thereof.

Claim 7 (currently amended): The sensor protein according to Claim 6, wherein the binding protein is inserted between the amino acid residues of ~~128 Ile-205 Ser~~ 128 Ile to 205 Ser of the Green Fluorescent Protein ~~which is the reporter protein.~~

Claim 8 (currently amended): The sensor protein according to Claim 4, wherein the fluorescent-labeled protein is a protein labeled with a fluorescent dye selected from fluorescein series, rhodamine series, eosin series and 7-nitrobenz-2-oxa-1, 3-diazole (NBD) series; ~~or a mutant thereof.~~

Claim 9 (currently amended): The sensor protein according to Claim 1, which is comprised of ~~an insert-type~~ a fusion protein, ~~wherein the binding protein is formed by inserting the amino acid sequence of an aryl hydrocarbon (Ah) receptor and the reporter protein is into the amino acid sequence of alkaline phosphatase.~~

Claim 10 (withdrawn): A nucleic acid encoding the protein according to any one of claims 1 to 9.

Claim 11 (currently amended): A method of preparing a sensor protein according to claim 1, comprising the steps of:

- (a) inserting a DNA encoding ~~a~~ the binding protein into a DNA sequence encoding ~~a~~ the reporter protein; and
- (b) expressing the resultant DNA encoding ~~an insert-type~~ the fusion protein.

Claim 12 (currently amended): A method of preparing a sensor protein according to claim 1, comprising the steps of:

- (a) inserting a DNA encoding a the binding protein into a DNA sequence encoding a the reporter protein;
- (b) introducing a mutation into the resultant DNA sequence encoding ~~an insert-type~~ the fusion protein to obtain a population of mutants of the DNA sequence encoding the ~~insert-type~~ fusion protein;
- (c) expressing the population of mutants of the DNA sequence encoding the ~~insert-type~~ fusion protein to obtain a population of mutants of the ~~insert-type~~ fusion protein; and
- (d) selecting ~~an insert-type~~ the fusion protein having a the desired function from the population of mutants of the ~~insert-type~~ fusion protein by detecting a change in the detection signal generated from the reporter protein by the action of a target substance to the binding protein.

Claim 13 (withdrawn): The method according to Claim 12, wherein the steps (b), (c) and (d) are repeatedly carried out.

Claim 14 (currently amended): A sensor protein according to claim 1 prepared by the method according to any one of Claims 11 to 13.

Claim 15 (withdrawn): A nucleic acid encoding the protein according to Claim 14.

Claim 16 (withdrawn): An expression vector containing the nucleic acid according to Claim 10 or 15.

Claim 17 (withdrawn): A transformed cell having the expression vector according to Claim 16.

Claim 18 (withdrawn): A method of preparing a sensor protein, comprising the steps of culturing the transformed cell according to Claim 17; and harvesting said sensor protein from the culture.

Claim 19 (withdrawn): A method of detecting or determining a target substance, comprising the steps of:
reacting the sensor protein according to any one of claims 1 to 9 and 14 with said target substance; and
measuring a change in the detection signal generated from the reporter protein that constitutes the sensor protein.

Claim 20 (withdrawn): The method according to Claim 19, wherein the reporter protein is a fluorescent protein.

Claim 21 (withdrawn): The method according to Claim 19, wherein the detection signal is fluorescence.

Claim 22 (withdrawn): The method according to any one of Claims 19 to 21, wherein detection or determination of the target substance is carried out in a living cell, tissue or individual.

Claim 23 (withdrawn): The method according to Claim 19, wherein the sensor protein is an insert-type fusion protein formed by inserting the amino acid sequence of Ah receptor into the amino acid sequence of alkaline phosphatase, and the target substance is dioxins or polychlorinated biphenyl.

Claim 24 (withdrawn): The method according to Claim 19, wherein the sensor protein is an insert-type fusion protein formed by inserting the amino acid sequence of calmodulin into the amino acid sequence of a fluorescent protein, and the target substance is a calcium ion.

Claim 25 (withdrawn): The method according to Claim 19 wherein the sensor protein is an insert-type fusion protein formed by inserting the amino acid sequence of a single chain antibody into the amino acid sequence of alkaline phosphatase, and the target substance is an antigen.

Claim 26 (withdrawn): A reagent kit for performing the method according to any one of Claims 19 to 24, which comprises the sensor protein according to any one of Claims 1 to 9 and 14 or the nucleic acid according to Claim 10 or 15.

Claim 27 (new): The sensor protein according to Claim 1, wherein the reporter protein is a Green Fluorescent Protein and the binding protein is a hormone receptor.

Claim 28 (new): The sensor protein according to Claim 27, wherein the hormone receptor is an aryl hydrocarbon receptor.